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Relationship between the use of ICT and the degree and type of diversification

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Abstract

Advances in information and communication technologies (ICT) has given way to a new genre of opportunities for companies expanding their horizons to explore new markets and to diversify their business. In this sense, the present study analyzes the impact that the use of ICT has on the degree and type of diversification of small and medium enterprises (SMEs). From a sample of 95 companies in the autonomous community of the Basque Country, it is evident that diversified companies show a higher level of use of ICT and this resource positively affects the degree of international diversification and the degree of relationship of business.

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Keywords: ICT, diversification, degree, type.

1. Introduction

Understanding that competitiveness and ability of a company to stay depends, among other things, on its ability to anticipate and respond to environmental pressures, some companies have had to rethink their competitive strategy in order for them to adapt to their environment [1]. These adjustments have led some companies to take the decision to expand their business lines and diversify to face economic globalization [2].

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Diversification means a company's expansion into new lines of products, processes, services or markets [3]. This implies that a company is active in a number of markets (sectors, industries or segments) that it was not previously engaged in. When the company decides to expand sales of their goods and services transcending the borders of countries and areas of the world into different markets, this is known as a geographic or international diversification[4].

Thus, the concept of diversification describes the degree or extent to which a firm is operating simultaneously in more than one industry in its field of activity and therefore in its corporate strategy[5]. Also, the entry into new business lines is always related to business performance, which has become essential to use a diversification measure that would check the results of this.

On the other hand, the changes caused by the influence of information technology and communication (ICT) have been equally relevant in studies of scholars of management in recent years and they see its importance as a link between the strategy of the firm and its business processes [6, 7]. It is evident that these technologies lead to an increase in productivity by reducing costs, which allow companies to increase the quality and output of new products [8].

Some studies relate ICT to the degree and type of diversification oft the company, indicating that these elements are influential in one way or another on business results [9-13]. However, it has been identified that there are a lack of studies which demonstrate that ICT is a key resource in implementing diversification within the value chain. It is evident that investment in this resource has been the unit of analysis used, but it has been considered in the literature as a "black box" and its impact has not been measure optimally. However, the level of use of ICT can place this investment into perspective[14].

The aim of this study is to contribute to the literature by empirically demonstrating the relationship between the use of ICT on specialized and diversified companies. Additionally, this study aims to show the impact on the degree of international diversification and the degree of relatedness of business in which the company participates.

As stated above, this paper starts with the theoretical background of the main concepts of diversification and ICT, which the hypotheses of this study are based on. The second part presents the methodology used in this empirical study. Subsequently the respective results and discussion of such are presented. The study ends with conclusions and future research that may occur in this field of research.

2. Theoretical background and hypotheses

From the point of view of the diversification strategy, there are triggers which integrates resources, managerial fundamentals and incentives [15], which are crucial for a company to decide how falls into this strategy.

With regards to the theory of resources, companies tend to begin a process of diversification in particular areas, where they can leverage their resources and knowledge base. They aim to use these resources fully and efficiently. In fact, diversified companies can share resources among their various businesses, generating cost advantages in all of them [16]. This is one of the theories which groups the majority of studies that relate the resources available to the company and the strategy of diversification [9, 16].

On the other hand, the diversification measure refers to the degree or level at which a company operates between various business segments The categorical measures of Wrigley [17] and Rumelt [18] are one of the most used in studies in this field. This measure is based on a series of ratios which are determined by the percentages of sales of each business. This identifies whether the company is diversified or specialized.

Similarly, when the company decides to expand sales of its products and services outside the borders of countries to enter different markets, which is known as international or geographic diversification [4]. The measure of this diversification reflects the degree to which an enterprise presents international activity (i.e. simultaneous activity in multiple international markets [10]. Sullivan [19] proposed a composite index through the use of two indicators; the intensity of overseas operations and its geographical reach. This index has subsequently been endorsed as the best way to measure international diversification and has subsequently been used in other studies [10] [20].

On the other hand, there are some guidelines to rank companies according to their diversification strategy based on the notion that if a company's businesses are characterized by products, markets or similar technologies, then these businesses can be related [21]. However, they are not classed as related when there is a greater difference between the current situation of the company and its new businesses. Other authors such as Stimpert [22] and Peinado [23], using

a measure of the degree of relatedness of the core business of the company with the new business to determine the type of diversification implemented.

2.1 ICT and business diversification

Technological developments play an important role in the realization of the goods and services that manifests itself through activities that are digitally more intensive [24]. For this reason, today's organizations believe that ICT is a way to fight competition by improving productivity, profitability and quality of operations [14]. This is because their innovations have provided opportunities to improve their processes and develop new business models and applications. In addition, ICT also helps companies to increase their potential for competitive advantage, enabling them to carry out primary and support activities, either at a lower cost or a path that leads to differentiation and at a higher price [25].

This new century has seen a strong propulsion for companies to adopt ICT as a means for a new business conduct [24], allowing businesses to rethink how they do business, stimulate creativity and ultimately create new opportunities [13]. Progress in these technologies has given way to a new genre of opportunities for organizations, making a strategic resource in which companies find new opportunities in the market, with low costs and high probability of success [8, 13].

Because of this, organizations often respond by leveraging ICT to find innovative applications that enable them to improve or expand the scope of theirs products and services [26]. This makes it clear that these technologies lead to an increase in productivity by reducing costs, allowing companies to increase quality, create new lines of business, diversify and transfer its borders.

However, it has taken time for the realization of ICT's direct positive impact on business performance in process activities (eg, supplier performance or providing customer service). ICT's advanced capabilities offer the promise of a greater organizational integration obtaining some indirect benefits [27].

The realization of the positive impact of the adoption of ICT allows for more specific recognition of the impact of these technologies on organizational strategy. These strategies have been forged through the use of digital technologies. There are few studies in this field [28], making this type of research attractive. However, it has been assumed that the intensive use of these technologies in operational processes are associated with substantial increases in the productivity of diversified companies. It has also been suggested that the adoption of this technology should lead to a positive increase in business results in companies with several lines of business.

A greater degree of diversification requires a greater need for coordination of assets and information processing within multi-business companies [29]. In addition, it is technologies such as the Internet, which are associated with an expansion of business scope and a decrease in the specialization of the company [30].

According to Dewan [29], the demand for ICT is relatively higher in companies with diversified business lines related because these firms require more coordination of resources than firms with unrelated businesses lines. The impact of these technologies on businesses is greater for companies involved than for unrelated [31]. These companies pursue diversification strategies, especially those who follow the unrelated diversification should prioritize the adoption of ICT in operating activities [32].

Since companies can use ICT capital to coordinate their resources and capabilities across different markets, this capital can facilitate the realization of economies of scope and allow companies to operate in several markets simultaneously [33]. In addition to this, Ravichandran [12], indicate that ICT (taking into account the coordination and control in companies) determine the success of international diversification.

According to the trigger elements in the diversification strategy proposed by Dewan [29] and Miller [16], ICT arises as a resource that can influence the variables degree and type of diversification . In this context and according to the information presented in this field, we propose the following hypothesis concerning the relationship between the use of ICT and diversification of businesses:

Hypothesis 1 Diversified companies have increased use of ICT specialized companies.
Hypothesis 2 The level of ICT use is positively related to the degree of international diversification.
Hypothesis 3 The level of ICT use is positively related to the degree of relationship between business.

3. Methodology

This study was developed through the implementation of a survey aimed at managers of SMEs established in the Autonomous Community of the Basque Country (CAPV) belonging to the industrial sector. The final sample consisted of 95 firms that replied to the questionnaire presented in physical format and online during the period September to November 2015.

3.1 Measurement of variables

Degree of diversification

This variable has been measured categorically dichotomous differentiating between diversified companies and specialized companies. This classification is based on the categories and measures proposed by Wrigley and Rumelt [17, 18]. Based on the ratio of specialization the main categories of businesses are identified (specialized, diversified and dominant business). Therefore, companies where the percentage of sales of its original business was more than 95% they are classified as specialty, between 95% and 70% they are identified as business dominant and lower 70% were classified as diversified. For purposes of this study, two types of company are identified; diversified and specialized (the latter includes dominant business).

Degree of international diversification

To measure this variable a composite index has been used, as suggested by Sullivan [19], through the use of two indicators; the intensity of foreign operations (ratio of foreign sales on total sales of the firm) and its geographical scope (number of countries in which companies operate).

Type of diversification

To measure the type of diversification has used the degree of relationship between the new business and the orginal business of the company. According to Stimpert and Duhaime [22], there is a measure to indicate the degree of relatedness of the original business of the company with the new business you choose to implement according to whether this is a commercial or technological type. Based on this parameter, Peinado and Menguzzato [23], develop a scale that allows capturing this relationship using seven elements of analysis of a commercial nature (customers, prestige brand, distribution channels, advertising expenses and promotion) and technological (production processes, expenditure on research and development, type of raw materials). The average of these seven elements identify the degree of relatedness of the original business and new business [22],[23]. The reliability of this measure is verified through Cronbach's Alpha statistic (0.823).

Use of ICT

To measure the use of ICT (UICT) within the company, the directors were requested to indicate how they consider the level of use of each of the 18 technology tools listed. The tool list selected has been suggested by the ITU[†], OECD[‡], Eurostat[§], INE[**], Eustat[††] and identified in other studies [34, 35]. This variable consists of the arithmetic mean

[†] ITU is the United Nations specialized agency for information and communication technologies – ICTs.
[‡] OECD is the Organisation for Economic Co-operation and Development
[§] Eurostat is the statistical office of the European Union
[**] National Statistics Institute (Spain)
[††] Eustat is the public body of the Basque Country that collects, analyses and publishes statistical information about every aspect of Basque Country

obtained from a five-point likert scale in which the directors indicated the level of use of each of the technologies presented. To validate this measure the reliability of the scale is verified through the statistical Alpha Cronbach (0.834).

4. Results

As shown in Figure 1 (a) that most of the companies in the sample (66%) are present in a single business and the remaining 34% in more than one. The average business other than that in which companies develop core business is 2,39. This indicates a low level of diversification of Basque companies, results are consistent with previous work done at the national level of Spain [32, 36, 37]. Figure 1 (b) shows the percentage of companies in the sample that perform some type of international activity. As shown in the chart, there are slightly more companies internationally active (52.6%) than those which are not (47.4%).

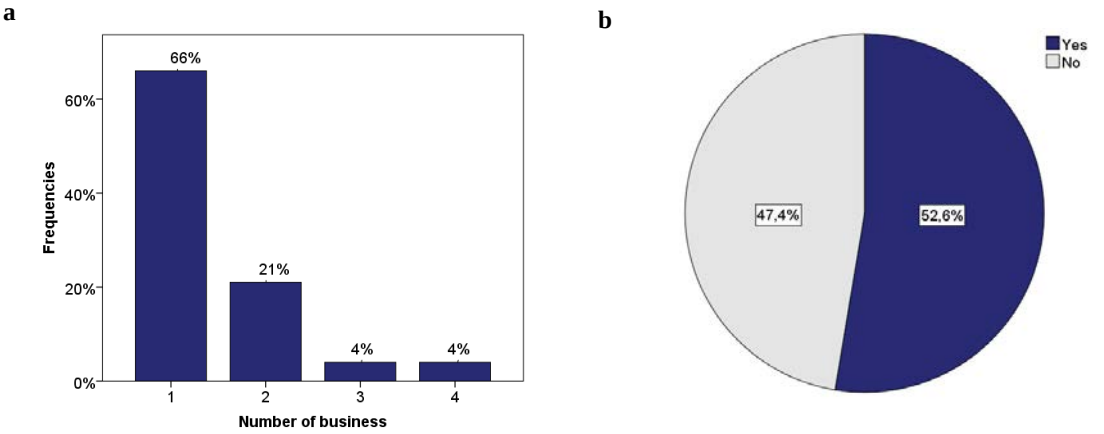

Fig. 1. (a) number of businesses in which the company participates; (b) percentage of companies with foreign activities.

On the other hand, Figure 2 shows the degree of use of each of ICT tools in the companies surveyed. It is evident that those mainstream technologies (computers, internet, e-mail) are used more frequently.

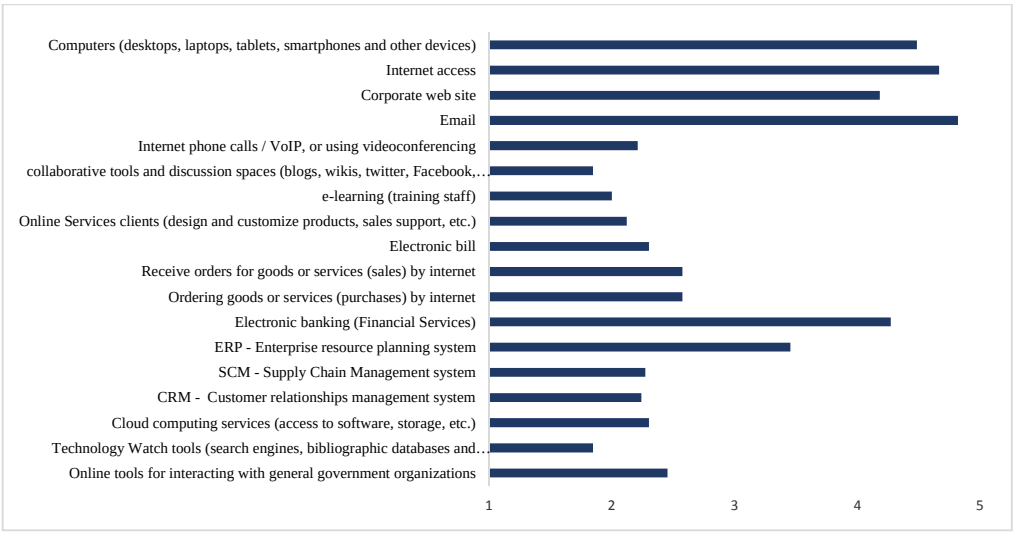

Figure 2. Level of use of ICT in SMEs

It also notes that the average level of use of ICT in SMEs in the Basque Country is low (2.90 to 5.0), with the collaboration tools, e-learning, and technological surveillance tools that stand by its low valuation. These poor results in the use of ICT would be in line with the work of Bayo and LeraBayo y Lera [38] and Cegarra [39].

4.1 Use of ICT and type of company

To analyze the relationship of the variables of this hypothesis, a bivariable test is used in order to check the significant differences between the use of ICT in enterprises diversified and specialized. Using the t test for independent samples, the equality of averages of the dependent variable in each of the defined categories is analyzed.

According to the Kolmogorov-Smirnov statistic applied to the two categories (specialized and diversified), we can say that the variable behaves normally. In addition, the Levene test found a significance greater than determined for acceptance (0,998) and therefore equal variances are assumed.

The average use of ICT in diversified companies is higher than in specialized companies in the proposed hypothesis 1, which is consistent with the work of Brews [30] and Chari[31]. To check whether this difference is significant the value of the T statistic is analysed.

It has been found that the t-test is not significant (0.595) and therefore, the null hypothesis of equal means can not be rejected. This means that although a higher level was found in the use of ICT in diversified companies on specialized, there is no significant difference. The initial proposal of the hypothesis (l) can not be accepted, due to the lack of sufficient statistical evidence.

4.2 Use of ICT and degree of international diversification

This hypothesis states that the use of ICT can be an important factor in the degree of international diversification. Under this assumption it is demonstrated that companies have a higher level of ICT use also have a greater degree of international diversification. The Kolmogorov-Smirnov test showed that the data meet the requirements of normality. It has been determined that the correlation coefficient (Pearson) is a positive value (0.446) with a statistically significant coefficient (p = 0.001), so we can conclude that both variables are associated directly.

With these correlation values it is possible to complement the statistical study through simple linear regression analysis to evaluate the relationship (Table1). Therefore, the following model, using a linear regression by OLS (Ordinary least squares).

$$Inter\_Div = b_0 + b_1 UICTi + b_2 Size + \varepsilon_i$$

The variable size (number of employees of the company) has been used for control purposes, which is consistent other studies [10], [32], [9].

Table 1. Model Summary UICT and degree of international diversification

Model	R	R^2	Adjusted R^2	Standard error of the estimate
1	,558[a]	,312	,283	,20766

a. Predictive variables: (constant), UICT, Size

The model developed has an R of 0.558, and R^2 0,312 indicating that 31,2% of the variability of the degree of international diversification depends on the use of ICT. The ANOVA statistic (analysis of variance) has a low value of 0.005, which confirms that the variables are linearly related. It also identifies a coefficient not standardized for UICT 0.176, with values near 1 VIF (1.003) in the two variables used, indicating that the multicollinearity is not a problem that affects the results.

These results show that companies with a higher degree of use of ICT have a greater degree of international diversification and the hypothesis (2) is confirmed.

4.3 Use of ICT and type of diversification

Initially it was found through the Kolmogorov-Smirnov statistical data the requirements of normality are met. Subsequently, according to the correlation coefficient (Pearson) obtained (0.408) it is statistically significant (p = 0.008), it can be concluded that both of the variables are directly associated.

With these correlation values it is possible to complement the statistical study through simple linear regression analysis to evaluate the relationship (Table 2). Therefore, the following model has been considered using a linear regression by OLS.

$$Degree\_of\_relationship = b_0 + b_1 UICT_i + \varepsilon_i.$$

The regression results indicate that 16.7% of the variability in the degree of business relationship is associated with the use of ICT. Also, the ANOVA table shows that the variables are linearly related with a level of significance below 0.05.

Table 2. Model Summary UTIC and degree of business relationship

Model	R	R^2	Adjusted R^2	Standard error of the estimate
1	,408[a]	,167	,145	,96955

a. Predictive variables: (constant), UICT,

Additionally, a non-standardized UICT of 0.669, with a value of 1 VIF (1,000) coefficient, indicates that multicollinearity does not affect the identified results. These results show that diversified companies with greater use of ICT have a higher degree of business relationship, confirming the hypothesis (3) raised.

5. Conclusions

Overall, the results provide support for theories based on the relationship of ICT and diversification strategy. The study suggests that resources such as ICT, can stimulate the entry of companies into new lines of business due to its influence on the different processes of the organization. This influence is observed in that the diversified businesses show greater use of ICT and are associated with a type of related diversification. Also, it is evident that these technologies are related to a greater degree of international diversification.

The framework presented in this article, within a comprehensive model, sets the objective of contributing the ICT directors and those responsible for business strategies in decision making within the company.

Because the study identified previous developed theoretical and empirical studies, it has revealed that there is great interest in analyzing the use of ICT and its impact on different organizational factors. This literature review has also identified the factors that lead companies to diversify its business, recognizing ICT a resource that can help companies find new opportunities to expand the range of organizations [11-13, 31, 40]

It is confirmed that although there is a high interest in academic studies and strategic diversification within the economic area, business diversification rates are still low level of Spain [32, 36, 37].

Likewise, the overall average of ICT still remains low in SMEs. The most commonly used technological tools, such as computers, internet, and email are the most used within SMEs. Other tools such as electronic banking obtain a higher value compared to other technologies. However, collaboration tools such as e-learning and technological surveillance tools are characterized by a low rating.

One of the limitations found during this research concern the size of the sample used. To obtain a greater sample of companies may add further confirmation of the results and classify them according to the characteristics of the companies and the specific activities of each one of them.

Among the future work that can be derived from this study would be to identify which of the technologies deployed generates the greatest impact on the performance, Also, a review of the relationship of ICT with other units of analysis of diversification as the input mode chosen to implement this strategy, would compliment this study further..

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